

Remarks

Claims 2, 3, and 5-8 are pending in the subject application and currently stand rejected. Reconsideration and favorable consideration of the pending claims is respectfully requested in view of the following remarks.

Claims 2, 3, and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo *et al.* (U.S. Pat. Pub. No. 2002/0061722) in view of Kilham (U.S. Patent No. 5,191,388). Applicant respectfully traverses. Submitted herewith is a Declaration under 37 CFR §1.132 by the inventor, Wan-Shick Kim.

Applicant maintains that Kondo *et al.* fails to teach or suggest providing diluent solution supply unit directly to the by-pass. As expressed by Mr. Kim at point 1 of the Declaration:

“The apparatus for producing polishing solution taught by Kondo *et al.* does not add diluent solution to a slurry bypass conduit when detecting particles of the slurry. Kondo *et al.* teaches using a bypass and analyzing the slurry without describing needing dilution. In particular, Kondo *et al.* uses a sensor that doesn’t require dilution. For example, Fig. 3(a) does not show enough fluctuations of voltage values. It could have shown more fluctuations if the slurry was diluted. The lack of frequent fluctuations in the curve indicates that the slurry is not diluted. Therefore, adding a diluent solution to the bypass of Kondo *et al.* is not inherent.”

However, for expediting prosecution of the subject application to completion, the focus of the following remarks relates to the claimed photo image sensor.

In particular, Kondo *et al.* and Kilham, alone or in combination, fail to teach or suggest a photo image sensor detecting a cross-sectional image of slurry flowing in the by-pass, detecting sizes of particles included in the captured image and a particle density of two dimensions of the slurry across a cross-section of the by-pass, and then using a slurry measuring unit to analyze the image captured by the photo image sensor.

As stated by Mr. Kim at point 2 of the Declaration:

“Kondo *et al.* does not disclose a photo image sensor detecting a cross-sectional image of slurry flowing in the by-pass, detecting sizes of particles included in the captured image and a particle density of two dimensions of the slurry across a

cross-section of the by-pass, and then using a slurry measuring unit to analyze the image captured by the photo image sensor. Instead, Kondo *et al.* teaches a particle detector that is a light-extinction type and adapted for irradiating a predetermined quantity of light on a flow cell fitted in the bypass conduit so as to detect an attenuation of the light transmitted through the polishing solution flowing through the flow cell, which is not an image. Rather, the result is a voltage fluctuation seen perpendicular to the flow direction. See Kondo *et al.* Fig. 2, paragraphs [0011], [0015], [0018], and Fig. 3.”

Furthermore, as stated at point 3 of the Declaration,

“the particle detector 7 of Kondo *et al.* includes a light detecting device such as a photodiode for detecting an intensity of the light emitted from the light source 72 and transmitted through the flow cell 74 (see Kondo *et al.* at paragraph [0048]). Therefore, the particle detector 7 of Kondo *et al.* does not analyze the cross-sectional image captured by the photo image sensor to measure the sizes of particles included in the slurry and the particle density of two dimensions of the slurry across the cross-section of the by-pass.”

Applicant asserts that Kilham does not cure this defect. In particular, as stated at points 4 and 5 of the Declaration:

“The apparatus for detecting and analyzing particulate matter in a slurry flow disclosed by Kilham *et al.* does not detect a particle density of two-dimensions. Rather, the optical fiber 22 of the apparatus taught by Kilham *et al.* detects a thin layer 84 image, which is a three dimensional image, of the slurry (see Fig. 3 and col. 7, lines 1-48 of Kilham *et al.*).

More particularly, Kilham *et al.* teaches imaging only a thin layer close to one end of the channel wall. Specifically, Kilham *et al.* states, at col. 7, lines 1-7:

‘In accordance with an important and essential aspect of the present invention, the focal length of optical fibers 22 which are used to view slurry 16 is very small such that only a thin layer 84 of slurry is focused for viewing, as shown best in FIG. 3. Such layer 84 preferably has a thickness T equal to the largest size of particulate matter 17 in slurry 16.’ (Emphasis Added).

In other words, Kilham teaches an image close to only one end of the channel wall, not a cross-sectional image which should include area between one end of the channel wall and the other end of the channel wall. Therefore, the particle detector **22** of Kilham *et al.* does not detect a particle density of two dimensions of the slurry solution across a cross-section of the by-pass.”

In addition, Applicant appreciates the Examiner’s further explanations regarding Kilham in the Response to Arguments section of the Office Action. However, the phrase “detecting a particle density of two-dimensions” is only a portion of the limitation, which recites “particle density of two dimensions of the slurry across a cross-section of the by-pass.” Furthermore, while the thickness of the detection area of the sensor of Kilham is a known value and the actual two-dimensional particle density of a portion of the area may be determined through a simple calculation, the sensor of Kilham does not detect a cross-sectional image across a cross-section of the by-pass. Therefore, a two-dimensional particle density based on the thin three-dimensional portion of the by-pass is not a two-dimensional particle density across the cross section of the by-pass. Accordingly, Applicant respectfully requests withdrawal of the §103(a) rejection of claims 2, 3, and 5-8.

Claims 2, 3, and 5-8 are also rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo *et al.* (U.S. Pat. Pub. No. 2002/0061722) in view of Kilham (U.S. Patent No. 5,191,388) and Grant *et al.* (U.S. Pat. Pub. No. 2003/0174306). Applicant respectfully traverses. As discussed above, Kondo *et al.* and Kilham, alone or in combination, fail to teach or suggest detecting a particle density of two dimensions of the slurry solution across a cross-section of the by-pass as specified in the claims. Grant *et al.* does not cure these defects. Accordingly, Applicant respectfully requests withdrawal of this §103(a) rejection of claims 2, 3, and 5-8.

In view of the foregoing remarks, Applicant believes that the claims as currently pending are in condition for allowance, and such action is respectfully requested.

Applicant invites the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 or 1.17 as required by this paper to Deposit Account 19-0065.

Respectfully submitted,



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Attachment: Declaration of Wan-Shick KIM under 37 CFR § 1.132